

STUDIES IN THE RANUNCULACEAE OF THE SOUTHEASTERN UNITED STATES. V. RANUNCULUS L.^{1,2}

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In providing a treatment of the Ranunculaceae for the forthcoming *Vascular Flora of the Southeastern United States*, a number of nomenclatural and taxonomic decisions were made which demand additional clarification. Throughout, this taxonomic treatment of *Ranunculus* is deliberately conservative and I have attempted specially to note those problem species deserving a thorough biosystematic study.

The cosmopolitan and heterogeneous genus *Ranunculus* is distinguished from other Ranunculaceae by its ensemble of alternate or basal leaves, non-spurred sepals, basally nectariferous petals, and achenes borne on relatively short fruiting receptacles. Within the southeastern United States, an area bounded by and including Louisiana, Arkansas, Kentucky, West Virginia, Maryland, and Delaware, I am recognizing 32 species of *Ranunculus*, as contrasted with over 400 species in the world (Buchheim, 1964) and 98 species for North America (Benson, 1948, 1954).

Aside from the earlier taxonomic treatments of the North American Ranunculi by Gray (1886) and Davis (1900), the only recent comprehensive treatment is by Benson who in a series of papers beginning in 1934, culminated his studies with a definitive treatment in 1948, followed by supplementary notes in 1954. Benson's work, largely followed in this paper, reflects mature scholarship and students of the North American Ranunculi will always be in his debt for his having so carefully laid the groundwork with respect to future biosystematic studies. (For an important recent taxonomic treatment of *Ranunculus* in Europe, including much pertinent biological information and a comprehensive list of references, see Dambolt, 1974). Nevertheless, with respect to the species in the southeastern United States, critical biosystematic studies (comparable to those by Harper, 1957; Fisher, 1965; Fisher et al., 1973) are needed in the *R. abortivus* complex (now underway at the University of North Carolina at Chapel Hill), the *R.*

¹ Based on a manuscript and notes compiled for the forthcoming *Vascular Flora of the Southeastern United States*. In general, the format follows Radford et al. (1967). Any suggestions for improving this treatment should be sent to me so that necessary corrections and additions can be made before the *Vascular Flora* is in press.

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septentrionalis—*R. hispidus* group (currently being worked on at the University of Michigan), and the *R. pusillus* complex. Relative variation of *R. acris*, *R. bulbosus*, *R. ficaria*, and *R. repens* in North America should be studied, especially in comparison with populations of these species in Europe. Furthermore, chromosome counts for fourteen species (44 percent) have yet to be published (Table I).

Table I. List of Species for Which Chromosome Counts are Needed.

<i>R. allegheniensis</i>	<i>R. longirostris</i>
<i>R. ambigens</i>	<i>R. marginatus</i>
<i>R. carolinianus</i>	<i>R. micranthus</i>
<i>R. flabellaris</i>	<i>R. pensylvanicus</i>
<i>R. harveyi</i>	<i>R. platensis</i>
<i>R. hispidus</i>	<i>R. pusillus</i>
<i>R. laxicaulis</i>	<i>R. subcordatus</i>

Although it is not the purpose of this paper to analyze the variously proposed subgeneric groupings of this genus, one should note the wide divergence of opinion regarding a broad taxonomic treatment of the buttercups and water crowfoots. For example, Benson (1940) classified all North American species under the genus *Ranunculus sensu lato* which in turn was divided into nine subgenera, whereas Tamura (1967) divided *Ranunculus* into 15 different genera. However, in the opinion of Davis (1960) and Cook (1966) there is yet no satisfactory classification of *Ranunculus*. Therefore, in the following treatment, informal groups are adopted (which largely conform to various subgeneric divisions recognized by Benson, 1940; also cf. Davis, 1965) to facilitate determining unknown specimens to their proper species. It must be emphasized that *Ranunculus* is a critical genus and that in collecting plants one should obtain basal portions (including roots), mature fruit and flowers, together with notes on the habitat.

KEY TO GROUPS OF SPECIES

- 1. Sepals (3-)5(-6); petals typically 5; achenes smooth to spiny or pubescent, usually with well-developed beaks; leaves seldom entire-cordate.
- 2. Petals usually glossy, yellow; achenes usually not transverse-ridged; terrestrial and aquatic herbs (subgen. *Ranunculus*).
- 3. Leaves (especially the lower cauline) variously lobed to divided or compound.
- 4. Basal leaves rarely deeply lobed, distinctly unlike the deeply parted cauline leaves; achenes turgid, ovoid, 1-2.5 mm long, without pronounced marginal rims GROUP 1.
- 4. Basal leaves mostly deeply parted or compound, usually similar to the smaller cauline leaves; achenes various, 2-5 mm long.
- 5. Achenes markedly spiny, papillose or tuberculate . . . GROUP 2.
- 5. Achenes smooth or rarely pubescent or papillose.
- 6. Achenes usually turgid, the marginal rims scarcely evident, corky-thickened below; marsh or aquatic plants . . . GROUP 3.
- 6. Achenes usually flattened, discoid, usually with pronounced marginal rims, not corky-thickened below; usually terrestrial plants GROUP 4.

3. Leaves all simple, entire to denticulate or serrulate, not lobed or deeply divided.
7. Pericarps smooth to verrucose, thick and firm; lower leaves linear to cordate-ovate; plants rarely stoloniferous GROUP 5.
7. Pericarps longitudinally striate, facially 3 or more nerved, thin and fragile; leaves cordate-ovate to ovate; plants stoloniferous GROUP 6.
2. Petals dull, white; achenes roughly transverse-ridged; aquatics with finely dissected to shallowly lobed leaves [subgen. *Batrachium* (DC.) A. Gray] GROUP 7.
1. Sepals 3(-4); petals 7-12; achenes pubescent, beakless; leaves cordate [subgen. *Ficaria* (Huds.) L. Benson] GROUP 8.

GROUP 1

1. Petals less than 3.5 mm long, equal to or shorter than the sepals; roots generally all filiform to some slightly fusiform-thickened.
2. Achene beaks 0.1-0.3 mm long; petals longer than $\frac{1}{2}$ length of the sepals; sepals glabrous to sparsely long-villous.
3. Plants usually glabrous; basal leaves 1-6(10) cm wide, reniform to cordate; roots usually all filiform; receptacles usually villous 1. R. ABORTIVUS.
3. Plants villous, at least basally; basal leaves 1-2.5 cm wide, proximally truncate to cuneate (rarely cordate); some roots slightly fusiform-thickened; receptacles usually glabrous 2. R. MICRANTHUS.
2. Achene beaks 0.6-1 mm long; petals less than $\frac{1}{2}$ length of the sepals; sepals hirsute 3. R. ALLEGHENIENSIS.
1. Petals 6-8 mm long, distinctly longer than the sepals; some roots markedly fusiform-thickened. 4. R. HARVEYI.

GROUP 2

1. Flowers pedunculate, the peduncles usually elongating in fruit; sepals and petals usually 5.
2. Petals 1-3 mm long; mature achenes papillate, each papilla with a slender hooked spine; receptacles glabrous. 5. R. PRAVIFLORUS.
2. Petals 4 mm or more long; mature achenes simply papillate to muricate or with straight to curved (not hooked) spines; receptacles pubescent.
3. Achenes papillate or tuberculate (or often \pm smooth), the bodies less than 3 mm long; achene beaks usually less than 0.5 mm long.
4. Achene discs sparsely papillate to smooth; petals greater than 5 mm long; plants more or less hirsute 6. R. SARDOUS.
4. Achene discs with numerous small tubercles; petals less than 5 mm long; plants with a few scattered villous hairs 7. R. TRILOBUS.
3. Achenes conspicuously tuberculate or muricate to stout spiny, the bodies greater than 3 mm long; achene beaks at least (0.75)1 mm long.
5. Achenes usually 10 or more, not in a single whorl; achene discs tuberculate to spiny, the margins smooth; largest leaves simple, broadly cordate to suborbicular and more or less 3-5 parted, the segments crenately lobed or toothed.
6. Achene discs stout spiny or occasionally muricate; achene beaks at least 1.5 mm long; peduncles usually shorter than the subtending leaf; plants subglabrate 8. R. MURICATUS.
6. Achene discs tuberculate to muricate; achene beaks ca. 1 mm

- long; peduncles usually longer than the subtending leaf; plants sparsely hispid 9. R. MARGINATUS.
5. Achenes 9 or less, in a single whorl; achene discs and margins tuberculate to long spiny; largest leaves compound, the ultimate segments linear to obovate 10. R. ARVENSIS.
1. Flowers sessile, axillary; sepals and petals 3 11. R. PLATENSIS.

GROUP 3

1. Petals 2-5 mm long; achenes essentially beakless (0.1 mm long); plants terrestrial to palustrine, without submersed leaves 12. R. SCELERATUS.
1. Petals 7-15 mm long; achene beaks well-developed (0.6-1.5 mm long); plants aquatic with finely dissected submersed leaves 13. R. FLABELLARIS.

GROUP 4

1. Petals small (2-4 mm long), about equalling the sepals.
2. Achene beaks markedly recurved; largest leaves merely deeply dissected; head of achenes globose 14. R. RECURVATUS.
2. Achene beaks straight to slightly curved; largest leaves ternately compound; head of achenes elongated, cylindrical.
3. Sepals often 2 times as long as the petals; stems erect, not rooting at the lower nodes; achene beaks 0.5-1 mm long. 15. R. PENNSYLVANICUS.
3. Sepals equal to or slightly shorter than the petals; stems ascending to trailing, frequently rooting at the lower nodes; achene beaks 1-1.5 mm long 16. R. MACOUNII.
1. Petals large (5-18 mm long), distinctly longer than the sepals.
4. Achene beaks recurved or hooked, usually less than 1.5 mm long, stigmatose laterally.
5. Sepals spreading.
6. Stems repent, rooting at the lower nodes; basal leaves ternately compound; receptacles hispid 17. R. REPENS.
6. Stems erect, never rooting; basal leaves deeply 5-parted; receptacles glabrous 18. R. ACRIS.
5. Sepals tightly reflexed.
7. Plants perennial, cormose; petals 8-14 mm long; achenes smooth 19. R. BULBOSUS.
7. Plants annual, soft-based; petals 5-8 mm long; achenes smooth to tuberculate 6. R. SARDOUS.
4. Achene beaks straight to flexuous, (1)1.5-3 mm long, stigmatose apically.
8. Plants slender, erect, never stoloniferous, the roots \pm fleshy-thickened; basal leaves both simple and compound, their stipules usually gradually tapering apically; mature achene bodies 1.5-3.5 mm long.
9. Roots \pm uniform; later basal leaves generally cordate-ovate in outline, often broader than long, usually ternately lobed or divided; stem pubescence hispid, spreading to appressed 20. R. HISPIDUS.
9. Roots both long-filiform and relatively short-tuberos (1-5 mm thick); later basal leaves generally ovate-oblong in outline, often longer than broad, usually pinnately divided; stem pubescence silky-appressed 21. R. FASCICULARIS.
8. Plants lax, often stoloniferous, the roots coarse-fibrous; basal leaves

usually all ternately compound, their stipules often broad, abruptly rounded or truncate apically; mature achene bodies 3-5 mm long.

10. Achenes 15-30, not broadly (0-0.3 mm) winged; petals rounded-obovate, 4-8 (13) mm wide; sepals spreading, longer than 2/3 length of petals; stems 2-8 mm in diameter, usually spreading-hispid 22. *R. SEPTENTRIONALIS*.
10. Achenes 7-15, broadly (0.5-1 mm) wing-keeled; petals oblong, 2-5(8) mm wide; sepals usually reflexed, about 1/2 length of petals; stems 1-3 mm in diameter, subglabrous to appressed- or spreading-hispid. 23. *R. CAROLINIANUS*.

GROUP 5

1. Petals 1-3, about equalling the sepals; annuals. 24. *R. PUSILLUS*.
1. Petals (4)5-9, distinctly longer than the sepals; annuals or perennials.
 2. Largest cauline leaves lanceolate to oblong-ovate; achene faces smooth to finely reticulate-pitted.
 3. Plants annuals with basal leaves; achenes ca. 0.6 mm broad, their beaks 0.1-0.2 mm long; sepals 1.5-2.5 mm long; blades of largest leaves usually less than 6 cm long. 25. *R. LAXICAULIS*.
 3. Plants perennials with no basal leaves; achenes ca. 1.4 mm broad, their beaks 0.5-1.3 mm long; sepals ca. 4 mm long; blades of largest leaves at least 6 cm long. 26. *R. AMBIGENS*.
 2. Largest cauline leaves cordate to subcordate; achene faces verrucose. 27. *R. SUBCORDATUS*.

GROUP 6

- One species 28. *R. CYMBALARIA*.

GROUP 7

1. Leaves floating, shallowly lobed; receptacles glabrous. 29. *R. HEDERACEUS*.
1. Leaves usually submersed, finely dissected; receptacles hispid.
 1. Leaves about as long as the adjacent internode, usually flaccid and generally collapsing when removed from the water; free petioles usually as long as the dilated stipular base; achene beaks absent or shorter than 0.3 mm long. 30. *R. TRICHOPHYLLUS*.
 2. Leaves usually much shorter than the adjacent internode, firm, not collapsing when removed from the water; free petioles absent or at least much shorter than the dilated stipular base; achene beaks 0.7-1.1 mm long. 31. *R. LONGIROSTRIS*.

GROUP 8

- One species 32. *R. FICARIA*.

GROUP 1

1. *R. ABORTIVUS* L., Small-flowered Crowfoot

Rich low woods, low fields and moist waste places; all prov. SE. [ALL]. Incl. *R. a.* var. *indivisus* Fern.—Fernald (1950), a form with undivided cauline leaves.

Ranunculus abortivus, the most widespread and common species within a complex of four apparently closely related species (nos. 1-4), is quite variable leading Fernald (1899, 1938) to describe several varieties. Only

one of these varieties (var. *indivisus*) occurs within the southeastern United States; it is restricted to the Nottoway River system in southeastern Virginia (Fernald, 1938). Although I am regarding var. *indivisus* of doubtful status (cf. Benson, 1948: a "rather questionable variety"), mass collections (cf. Fassett, 1942; note that Fassett did not sample populations of *R. abortivus* within Virginia) of this species within the southeastern United States would be desirable.

2. *R. MICRANTHUS* Nuttall

Rich woods, rocky hillsides, and calcareous banks; chiefly pied. and mts. Ark., Ky., Md., N.C., Tenn., Va., W.Va. [ALL except Tex.]. Incl. *R. m.* var. *delitescens* (Greene) Fern.—Fernald (1950), a pale green form with the simple basal leaves having relatively fewer teeth and cuneate to truncate bases.

Fernald (1939) recognized three varieties, one [var. *cymbalistes* (Greene) Fern.] restricted to Indiana, the other two widely ranging in the eastern United States. The two eastern varieties are distinguished chiefly by leaf shape and texture—var. *delitescens* (Greene) Fern. with pale green dull foliage and proximally subtruncate to cuneate basal leaves and var. *micranthus* with darker green lustrous foliage and subcordate to cordate basal leaves. There does not seem to be any marked geographic pattern conformable to these two morphs, however, and I am following Benson (1948) in treating *R. micranthus* as one polymorphic species, although Fassett (1942) suggested that mass collections throughout the range might throw light on the validity of segregating any geographically-based or ecotypic varieties.

3. *R. ALLEGHENIENSIS* Britton

Rich woods and calcareous slopes; chiefly mts. Md., N.C., Tenn., Va., W.Va. [Ohio, Pa.].

4. *R. HARVEYI* (Gray) Britton

Low woods, bluffs and ravines, rare; all prov. Ala., Ark., Tenn. [Okla., Mo., Ill.].

This is a distinct and relatively invariant species with a limited range in south-central United States. Occasional forms are strongly pilose which have been segregated as var. *pilosus* Benke (1928). Field studies should be pursued to establish population variability especially in view of assessing any geographic correlation with the degree of pubescence.

GROUP 2

This Group (nos. 5-11; = section *Echinella* DC.—Benson, 1948) are naturalized annuals native to Europe, western Asia, and South America (*R. platensis*). They are characterized principally by their more or less discoid achenes facially covered with papillae, tubercles, straight to curved spines,

or slender hooks. Several of these weedy introductions are rare (*R. marginatus*, *R. platensis*, *R. trilobus*) whereas two species especially (*R. parviflorus*, *R. sardous*) are widespread and relatively common weeds of fields and waste places.

5. *R. PARVIFLORUS* L.

Fields and waste places; chiefly cp. and pied. SE except Del. and W.Va. [Tex., Okla., Mo.].

For a detailed study of the morphology and ecology of this species in Europe see Salisbury (1931).

6. *R. SARDOUS* Crantz

Low fields and waste places; chiefly cp. and pied. Ala., Ark., Ga., Ky., La., Miss., N.C., S.C., Tenn., Va. [Mo., Ill., Pa., N.J.]. *R. parvulus* L.—Small (1933).

Ranunculus sardous can be confused with *R. bulbosus*, but the former species is distinguished by its annual habit, soft-based noncormose stems, smaller flowers, and typically papillose or tuberculate achene discs (faces).

7. *R. TRILOBUS* Desf.

Low clearings and roadsides, very rare; cp. Fla., La.

This species was first reported for the United States by Shinnars (1960) who collected it in April, 1960, in Louisiana; it has since been collected in Florida by R. K. Godfrey (FSU!).

8. *R. MURICATUS* L.

Low meadows, ditches and stream banks; cp., rarely pied. Ala., Ark., La., Miss., S.C. [Tex.].

9. *R. MARGINATUS* d'Urv.

Roadside ditches, very rare; cp. La.

This is another species first reported for the United States by Shinnars (1962). Superficially it resembles the more common *R. muricatus* but *R. marginatus* has a more pubescent habit, tuberculate or muricate achene discs and shorter achene beaks (cf. key to Group 2, above). In his report, Shinnars (1962) determined his material as *R. trachycarpus*, but in this paper I am following Tutin (1964) and Davis (1965) in determining our material as *R. marginatus* although specimens with tuberculate or muricate achene discs can be distinguished as variety *trachycarpus* (Fisch. & Meyer) Azn.

10. *R. ARVENSIS* L.

Fields and waste ground, uncommon; chiefly cp. and pied. Ga., Miss., N.C., S.C. [Mo., Ohio, N.J.]. Incl. var. *tuberculatus* (DC.) Koch—Radford (1968).

The sculpturing of the achenes in this species is quite variable which has led to the segregation of a number of varieties by earlier European workers (Dambolt, 1974). Inasmuch as single populations often are polymorphic (Davis, 1965), I am not giving formal recognition to the major variants in our flora (cf. Ahles et al., 1958), a practice currently followed by Tutin (1964), Davis (1965), and Dambolt (1974).

11. *R. PLATENSIS* Sprengel

Sandy clearings along streams, very rare; cp. Fla., La. [Tex.].

GROUP 3

12. *R. SCELERATUS* L.

Marshes, wet ditches, lake and stream banks; cp. and pied. SE except Ark. [ALL].

13. *R. FLABELLARIS* Raf., Yellow Water Crowfoot

Shallow water and muddy shores, rare; chiefly cp. Ala., Ark. cp and mts., Del., La., N.C., Va. [ALL except Tex.]. *R. delphinifolius* Torrey—Small (1933).

Heterophylly in this species is apparently controlled by temperature, photoperiod, and whether the leaf primordia developed in a submerged or terrestrial environment (Bostrack and Millington, 1962).

GROUP 4

14. *R. RECURVATUS* Poiret, Hooked Buttercup

Rich low woods; all prov. SE. [ALL]. Incl. *R. r.* var. *adpressipilis* Weath.—Fernald (1950), a form with scattered, closely adpressed cauline hairs.

The pubescence of this species is variable (lower stems \pm glabrous; stems with strongly villous 2-3 celled hairs; stems with unicellular appressed hairs) leading Weatherby (1929) to describe several infraspecific taxa. Population studies assessing the degree of polymorphism would be desirable, and pending such work I consider Weatherby's taxa of doubtful taxonomic significance.

15. *R. PENSYLVANICUS* L.f., Bristly Crowfoot

Marshes, wet woods and meadows, rare; cp. Del. [ALL except Tex., Okla., Mo.].

16. *R. MACOUNII* Britton

Marshes, very rare; mts. Pendleton Co., W.Va. A northern species, widely disjunct in our area (see Hutton, 1971).

17. *R. REPENS* L., Creeping Buttercup, Swamp Buttercup

Low meadows, stream banks, waste places; all prov. Del., Ky., Md., N.C.,

S.C., Tenn., Va., W. Va. [ALL except Okla.] Incl. *R. r.* var. *pleniflorus* Fern.—Fernald (1950). A variable species; double-flowered forms (var. *pleniflorus*) frequently escape from cultivation.

Ranunculus repens and its allies (nos. 17, 18, 19) are European introductions now widely scattered in North America. The demography and floral biology of all three species have been thoroughly studied in England by John Harper and his associates (see especially Harper, 1957; Sarukhán and Harper, 1973) and similar studies on North American populations would be desirable especially from a comparative evolutionary standpoint.

The swamp buttercup is very variable, a fact leading Fernald (1919) to recognize six varieties. At present, I am following European workers (Tutin, 1964; Davis, 1965; Dambolt, 1974) who regard *R. repens* as one polymorphic species, although I agree with Tutin (1964) that it is “much in need of detailed investigation.”

18. *R. ACRIS* L., Tall Buttercup

Pastures, meadows, clearings and waste places; all prov. Del., Ga. pied., Md. cp., N.C., S.C., Tenn., Va., W.Va. [ALL except Tex. and Okla.].

Ranunculus acris is an exceedingly variable complex in Europe and Asia (Hara and Kurosawa, 1956; Tutin, 1964; Coles, 1971), varying chiefly with regard to overall height, type of rootstock, leaves (shape, lobing, texture), pubescence (stems, leaves, filaments), number of flowers, and achenes (size, shape, length of beak) (Tutin, 1964). On the other hand, students of North American *Ranunculi* (e.g. Benson, 1948) generally regard the plants of eastern North America as one taxon. Comparative studies (such as those by Coles, 1971) of scattered populations in North America would be most useful, especially in view of the considerable variability of the Old World material.

19. *R. BULBOSUS* L., Bulbous Buttercup

Fields, roadsides, and pastures; all prov. Ala., Ark., Del., Ga., La., Md., N.C., S.C., Tenn., Va., W.Va. [ALL except Tex. and Okla.]. Incl. *R. b.* var. *valdepubens* (Jordan) Briquet, *R. b.* var. *dissectus* Bailey—Fernald (1950).

Ranunculus bulbosus is another variable species native to the Old World and which over the years has been subjected to excessive splitting into species and infraspecific taxa (Coles, 1973). For example, in the *Flora Europaea*, Tutin (1964) recognized 6 subspecies based on variations in the leaves, corms, roots, plant heights, and pubescence. However, Coles (1973) has recently studied the *R. bulbosus* complex in Europe and she concluded there are only two subspecies: subsp. *bulbosus* with well-formed corms, thin roots, compound basal leaves with stalked terminal segments and fine petiolar hairs and subsp. *adscendens* (Brot.) Neves, with scarcely cormose rootstocks, tuberous roots, simple basal leaves, and coarse petiolar hairs.

Within the southeastern United States, such a division does not appear to be correlated with either geography or ecology and therefore I am following Benson (1948) in recognizing *R. bulbosus* as a single variable species, although thorough field studies may lead to a revision of this interpretation.

The *R. septentrionalis*—*R. hispidus* complex (nos. 20-23) is an extremely critical group (cf. Benson, 1962). Within the southeastern United States there are four polymorphic species in this complex plus a number of segregate infraspecific taxa (Benson, 1948). With adequate material, the species usually can be distinguished (Table II), although intergradient forms occur. In collecting specimens, special care should be exercised in securing mature plants with flowers and fruits, basal leaves, roots, and any stoloniferous branches (in nos. 22, 23).

20. *R. HISPIDUS* Michaux, Hispid Buttercup

Dry rocky to rich moist woods; all prov. Ala., Ark., Ga., Ky., Md., Miss., N.C., S.C., Tenn., Va., W.Va. [ALL]. Incl. *R. h.* var. *falsus* Fern.—Fernald (1950); *R. h.* var. *marilandicus* (Poiret) Benson—Gleason and Cronquist (1963); *R. h.* var. *eurylobus* Benson—Fernald (1950), Gleason and Cronquist (1963). A highly variable species in need of critical study.

According to Benson (1948) there are four varieties of *R. hispidus* (for photographs of all four varieties, see Benson, 1962, Figs. 2-15, 16), based chiefly on variations in pubescence, basal leaf shape, size, and division, and flowering period. Inasmuch as the geographic ranges considerably overlap (Benson, 1962, Fig. 2-17) and because the ecological requirements as well as the population variability of these infraspecific segregates are not sufficiently well understood at the present time, I am regarding *R. hispidus* as a single polymorphic species.

21. *R. FASCICULARIS* Muhl. ex Bigel.

Prairies, thin dry woods and exposed calcareous slopes and ledges; chiefly cp. and pied. Ala., Ark., Ky., La., Md. mts., Miss., S.C., Tenn., Va. [ALL except N.J.]. Incl. *R. f.* var. *apricus* (Greene) Fern.—Fernald (1950), a form with less divided leaves.

Greene (1900) described the smaller and simpler-leaved plants of south-central United States as *R. apricus*, later reduced by Fernald (1936) to a variety under *R. fascicularis*. Although this segregate might well be given taxonomic recognition, because of numerous intermediates I prefer to regard the southern form as an extreme variant within an apparent ecocline ranging throughout eastern North America.

22. *R. SEPTENTRIONALIS* Poiret, Northern Swamp Buttercup

Low woods, marshes, meadows and alluvial thickets; all prov. Ark., Ga., Ky., Md., N.C. mts., Tenn. mts., Va., W.Va. [ALL except Tex. and Okla.].

Table II. Comparison of Species in the *R. septentrionalis*—*R. hispidus* Complex*

Characteristic	<i>R. septentrionalis</i>	<i>R. carolinianus</i>	<i>R. hispidus</i>	<i>R. fascicularis</i>
Height (dm)	2-6	1.5-6	1-4	1-3
Stoloniferous	+	+	—	—
Stem pubescence	±Spreading-hispid	Subglabrous to spreading-hispid	Hispid	Appressed-hispid or pilose
Roots	Fibrous	Fibrous	±Fleshy	Filiform and tuberous
Basal leaves	All compound	(Simple) Compound	Simple and compound	Simple and compound
Later basal leaves	Ternate	Ternate	Ternately lobed or divided	Pinnately divided
Stipular leaf bases	Broad, apically truncate to rounded		Long, narrow, apically ±tapering	
Sepals: habit	Spreading	Reflexed	Spreading	Spreading
length (mm)	6-11	3.5-5 (7)	4-6	6-8
Petals: shape	Rounded-obovate	Oblong	Obovate to oblong	Linear-oblong to obovate
length (mm)	8-12	7-12	9-13	7-15
Carpel number	15-30	7-15	12-30	10-30
Achene margins	Keeled	Winged (wings ca. 1 mm high)	Narrowly keeled	Keeled
Chromosome number (n=)	16, 32 (?)	—	16	16
Habitat	Low woods, marshes, meadows and alluvial thickets	Low woods, thickets, marshes	Dry rocky ground, rich moist woods	Thin dry woods, exposed calcareous ledges
Range	N.D. to Lab., s. to Ga., Tenn., and Ark.	Minn. to Pa., s. to n. Fla., and w. to Tex.	S.D. and Neb. to Mass., s. to Ga., Ala. and Ark.	Minn. to Mass., s. to S.C., Ala., Miss., La., and Tex.

* Based in part on Benson (1948).

Incl. *R. s.* var. *caricetorum* (Greene) Fern.—Fernald (1950), a form with the petioles and lower internodes densely retrorsely-hispid; incl. *R. carolinianus* DC.—sensu Radford (1968), *pro parte*.

The form with densely retrorsely-hispid petioles is not associated with other characters (Benson, 1948) and does not appear to warrant taxonomic recognition.

23. *R. CAROLINIANUS* DC.

Low woods, thickets and marshes; all prov. Ala., Ark., Fla., Ga., N.C., S.C., Tenn., Va., W.Va. [Tex., Okla., Mo., Ill., Pa.]. *R. septentrionalis* Poiret var. *pterocarpus* Benson—Gleason and Cronquist (1963); *R. palmatus* sensu Small, *non* Ell.—Small (1933); *R. carolinianus* DC.—sensu Radford (1968), *pro parte*.

Some authors (e.g., Radford, 1968) lump *R. septentrionalis* and *R. carolinianus* or else regard *R. carolinianus* as a variety (var. *pterocarpus* Benson) of *R. septentrionalis* (e.g. Gleason and Cronquist, 1963). Pending additional study I am presently following Benson (1948) in recognizing *R. carolinianus* as a distinct species. Nevertheless, it is not always clearly distinct from *R. septentrionalis* and collectors should take special care to secure specimens with mature achenes.

GROUP 5

Plants of the *R. pusillus*—*R. ambigens* group [section *Flammula* (Webb) Ruoy & Faucaud] generally occur in low wet areas. As a group, these species are distinguished by their 5 sepals, variable number of yellow petals, simple entire to denticulate or serrulate leaves, and smooth to papillose or verrucose achenes. Although the species can usually be separated (Table III), several species are quite polymorphic and the group as a whole deserves a careful population and experimental taxonomic study, including chromosome counts which are lacking for all four species. The nomenclature in this complex is confused, and I have tried to rectify matters in Table IV.

24. *R. PUSILLUS* Poiret

Low wet grounds and shallow pools; chiefly cp. and pied. SE. [ALL]. Incl. *R. lindheimeri* Engelm., *R. tener* Mohr—Small (1933).

The widespread *R. pusillus* is quite variable, leading Small (1933) to recognize three species, differentiated chiefly by the shape of the fruiting heads (globose to cylindrical) and achene texture (smooth to papillose). It appears that within the southeastern United States particularly in the western portion of the range (cf. Table III), the fruiting heads tend to become elongated and the achenes papillose [= *R. tener* Mohr; var. *angustifolius* (Engelm.) Benson]. However, until field studies are undertaken to analyze the variability of local populations as well as possible relative geo-

Table III. Comparison of Species in the *R. ambigens*—*R. pusillus* Complex*

Characteristic	<i>R. ambigens</i>	<i>R. laxicaulis</i>	<i>R. pusillus</i>	<i>R. subcordatus</i>
Habit	Perennial	Annual	Annual	Perennial
Basal leaves	Absent	Present	Present	Absent
Cauline leaves: shape	±Lanceolate	Lance-ovate to oblong	Lance-ovate to suborbicular	±Cordate
margin	Usually denticulate	±Entire	Entire to denticulate	Entire to denticulate
length (cm)	6-14	1-6	1-5	1-3.5
Sepal length (mm)	4	1.5-2.5	1-2	1.9-2.2
Petals:				
number	5 (-6)	5 (-10)	1-3	4-8
length (mm)	5-7	3-4 (9)	1-1.5	3-4
Achenes:				
body length (mm)	2	0.6-0.7	1	1
beak length (mm)	1-1.3	0.1-0.2	0.1-0.2	0.1-0.2
texture of disc	Smooth or finely reticulate	Smooth	Smooth to papillate	Verrucose
Range	Minn. to Maine, s. to S.C., Tenn., and La.	Kans. to Ind. and Del., s. to S.C. Tenn., Ark. and Tex.	Mo. to N.Y., s. to Fla. and Tex.; disjunct in Calif.	Rare, N.C.

* Based in part on Benson (1948) and Beal (1971).

Table IV. Nomenclature of *R. ambigens*, *R. laxicaulis*, and *R. pusillus*

Benson (1948, 1954)	Radford (1968)	Fernald (1950)	Gleason and Cronquist (1963)	Small (1933)
1. <i>R. ambigens</i> Wats.	<i>R. ambigens</i>	<i>R. ambigens</i>	<i>R. ambigens</i>	<i>R. obtusiusculus</i> Raf.
2. <i>R. laxicaulis</i> (T. & G.) Darby	<i>R. laxicaulis</i>	<i>R. laxicaulis</i>	<i>R. texensis</i> Engelm.	<i>R. mississippiensis</i> Small <i>R. oblongifolius sensu</i> Small, <i>non</i> Elliott
3. <i>R. pusillus</i> Poiret				
a. var. <i>pusillus</i>	<i>R. pusillus</i>	<i>R. pusillus</i>	<i>R. pusillus</i>	<i>R. pusillus</i> <i>R. lindheimeri</i> Engelm.
b. var. <i>angustifolius</i> (Engelm.) Benson				<i>R. tener</i> Mohr

graphic discontinuities, I prefer to regard *R. pusillus* as a single widespread polymorphic species.

25. *R. LAXICAULIS* (Torrey & Gray) Darby

Marshes and ditches; chiefly cp. Ark., Del., La., Md., S.C., Tenn., Va. [Tex., Okla., Mo., Ill., Ind.]. *R. oblongifolius sensu* Small, *non* Ell.—Small (1933); *R. texensis* Engelm.—Gleason and Cronquist (1963); incl. *R. mississippiensis* Small—Small (1933).

26. *R. AMBIGENS* Watson

Low wet grounds and shores; chiefly cp. and pied. Ala., Del., La., Md., N.C., S.C., Tenn., Va., W.Va. [Ohio, Pa., N.J.]. *R. obtusiusculus* Raf.—Small (1933).

27. *R. SUBCORDATUS* E. O. Beal

Marshy shores and wooded streams, rare; cp. N.C.

Beal (1971) recently described this species from the Coastal Plain of North Carolina. It appears to be closely related to *R. bonariensis* Poiret of South America (Beal, 1971), but is relatively distinct from other species in the *R. pusillus*—*R. ambigens* group (nos. 24-26). *R. subcordatus* is known only from Bladen and Halifax Counties, North Carolina, and collectors are advised to look for it elsewhere in the Coastal Plain of the southeastern United States.

GROUP 6

28. *R. CYMBALARIA* Pursh, Seaside Crowfoot

Marshes and muddy shores, rare; cp. Ark. [Tex., Okla., Mo., Ill., N.J.].

GROUP 7

The batrachian Ranunculi (nos. 29-31 in this treatment) have long been considered a difficult group, doubtless due to their marked phenotypic plasticity. Nevertheless, a number of revisions have been attempted (e.g. Drew, 1936; Benson, 1948), the most recent by Cook (1966) whose treatment I am following with respect to the taxonomy of the Batrachia of the southeastern United States. I am also following Cook (1963, 1966) in regarding the batrachian Ranunculi as a subgenus of *Ranunculus*, although the group is often treated as a separate genus (e.g. Small, 1933; Tamura, 1967). As Cook (1963, 1966) points out, however, *Batrachium* cannot be separated from *Ranunculus* by any single character and therefore he argued for its retention within *Ranunculus*. The batrachian Ranunculi typically are aquatics with laminate or capillary leaves, white petals and transversely-ridged achenes.

29. *R. HEDERACEUS* L.

Fresh water aquatic; cp., rarely farther inland. Md., N.C., S.C., Va. [Pa.].

30. R. TRICHOPHYLLUS Chaix, White Water Crowfoot

Fresh water aquatic, rare; mts. Ky., W.Va. [Pa., N.J.]. *Batrachium flaccidum* (Persoon) Rupr.—Small (1933); *R. aquatilis* L. var. *capillaceus* (Thuillier) DC.—Gleason and Cronquist (1963).

GROUP 8

31. R. LONGIROSTRIS Godron

Aquatic in sluggish fresh water, rare. Ala. cp., Del. cp., Va. pied. [ALL]. *Batrachium trichophyllum sensu* Small, *non* Chaix—Small (1933).

32. R. FICARIA L., Lesser Celandine

Cultivated plant, occasionally escaped to open woods and waste places, rare; cp. Md., Tenn., Va., W.Va. [Pa., N.J.].

Ranunculus ficaria is a polymorphic and cytologically complex species (Greene and Thomas, 1961; Gill et al., 1972; Marchant and Brighton, 1974) with a number of unusual features (cordate leaves, 3 sepals, 7-21 yellow petals, pubescent beakless achenes and markedly unequal cotyledons) leading some taxonomists (e.g. Tamura, 1967) to segregate these plants as a separate genus. There can be no doubt that *Ranunculus s.l.* should be thoroughly revised and the species reclassified (cf. Davis, 1965; Cook, 1966), but pending such work, I prefer to regard *R. ficaria* as a species in *Ranunculus*.

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